

ABSTRACT

The present invention provides methods and apparatuses for constructing observed data from a Compton camera in order to provide a three-dimensional image of a radiopharmaceutical source distribution within a patient. No intermediate two-dimensional images are formed. Observed data may be analyzed by a processor in order to construct a three-dimensional image representing the source distribution. An idealized mathematical model may express the observed Compton camera data in terms of an integral over the source distribution. An exact analytic inversion is then found for this idealized model. The new analytic solutions arise from a generalization of the integral equation used to model the Compton camera. The kernel of the integral equation is modified by the introduction of an index p that describes the effect of source distance from the camera.